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Wind Streaks on Venus: Preliminary Global Assessment

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The Magellan mission has obtained ~99% imaging (SAR) coverage for Venus. These data are compiled in various formats and spatial resolutions. Basic Image Data Records (BIDRS) and Mosaicked Image Data Records (MIDRS) were searched for wind-related features; features ≤10 km were searched on BIDRS and >10 km on MIDRS, resulting in the discovery of dune fields and yardangs, and a data base of some 5805 wind streaks cataloged by type, size, azimuth, location, etc. Preliminary analyses show that "linear" streaks (i.e., those in which length >20 times width) are the most common form; mean streak length is 10-15 km. Wind streaks are found at nearly all latitudes and longitudes of Venus, suggesting that surficial material in thicknesses sufficient (>few tens of cm) to produce a radar signature is present in most places. As found in an earlier study, streaks are commonly associated with young impact craters and tessera terrain. This relationship is attributed to the assumption that these areas provide a ready supply of particles capable of transport by wind. Initial assessment shows that streaks tend to be oriented toward the west; the remaining streak population has a predominantly equatorward direction. This pattern reflects the influence of the westward zonal atmospheric superrotation on the formation of wind streaks, and the influence of a lower atmosphere Hadley cell. Some streaks probably resulted from transient local winds associated with impact events. Studies underway involve isolating these streaks from the data base, so that the long term atmospheric circulation can be better assessed.